

We claim:

1. A method of depositing an optical quality silica film by PECVD (Plasma Enhanced Chemical Vapor Deposition), comprising:
 - a) independently setting a predetermined flow rate for a raw material gas;
 - 5 b) independently setting a predetermined flow rate for an oxidation gas;
 - c) independently setting a predetermined flow rate for a carrier gas;
 - d) independently setting a predetermined total deposition pressure; and
 - e) applying a post deposition heat treatment to the deposited film at a temperature selected to optimize the mechanical properties without affecting the optical properties
- 10 determined in steps *a* to *d*.
2. A method as claimed in claim 1, further comprising independently setting a predetermined flow rate for a dopant gas.
3. A method as claimed in claim 2, wherein the observed FTIR characteristics of the deposited film are monitored to determine the optimum post deposition heat treatment
- 15 temperature.
4. A method as claimed in claim 1, wherein the post deposition heat treatment temperature lies in the range 600 to 900°C.
5. A method as claimed in claim 4, wherein the deposition is carried out at a temperature in the range 100 to 650°C.
- 20 6. A method as claimed in claim 5, wherein the deposition is carried out at a temperature of about 400°C.
7. A method as claimed in claim 1, wherein the raw material gas is selected from the group consisting : silane, SiH_4 ; silicon tetra-chloride, SiCl_4 ; silicon tetra-fluoride, SiF_4 ; disilane, Si_2H_6 ; dichloro-silane, SiH_2Cl_2 ; chloro-fluoro-silane SiCl_2F_2 ; difluoro-silane, SiH_2F_2 ; and any other silicon containing gas containing hydrogen, H, chlorine, Cl, fluorine, F, bromine, Br, or iodine, I.
- 25 8. A method as claimed in claim 7, wherein the oxidation gas is selected from the group consisting of: nitrous oxide, N_2O ; O_2 , nitric oxide, NO_2 ; water, H_2O ; hydrogen peroxide, H_2O_2 ; carbon monoxide, CO ; and carbon dioxide, CO_2 .

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9. A method as claimed in claim 8, wherein the carried gas is selected from the group consisting of nitrogen, N_2 ; helium, He; neon, Ne; argon, Ar; or krypton, Kr.
10. A method as claimed in claim 2, wherein the dopant gas is selected from the group consisting of phosphene, PH_3 ; diborane, B_2H_6 ; Arsine (AsH_3); Titanium hydride, TiH_4 ; germane, GeH_4 ; Silicon Tetrafluoride, SiF_4 ; and carbon tetrafluoride, CF_4 .
11. A method as claimed in claim 2, wherein the raw material gas is SiH_4 , the oxidation gas is N_2O , the carrier gas is N_2 , and the dopant gas is PH_3 .
12. A method as claimed in claim 11, wherein the SiH_4 gas flow is set at about 0.2 std liters/min., the N_2O gas flow is set at about 6.00 std liters/min., the N_2 flow is set at about 3.15 liters/min., and the PH_3 is set at about 0.50 std liters/min.
13. A method of depositing an optical quality silica film by PECVD (Plasma Enhanced Chemical Vapor Deposition), comprising:
- a) independently setting a flow rate for SiH_4 at about 0.2 std liters/min.;
 - b) independently setting a flow rate for N_2O at about 6.00 .2 std liters/min.;
 - c) independently setting a flow rate for a carrier gas;
 - d) independently setting a predetermined total deposition pressure; and
 - e) applying a post deposition heat treatment to the deposited film at a temperature between 600° and $900^\circ C$ selected to optimize the mechanical properties without affecting the optical properties determined in steps *a* to *d*.
14. A method as claimed in claim 13, wherein the carrier gas is N_2 and the flow rate is set at about 3.15 2 std liters/min.
15. A method as claimed in claim 14, further comprising independently setting a predetermined flow rate for a dopant gas.
16. A method as claimed in claim 15, wherein the dopant gas is PH_3 and the flow rate is set at about 0.50 std liters/min.
- 17., A method as claimed in claim 15, wherein the total deposition pressure is set at about 2.6 Torr.

18. A method as claimed in claim 13, wherein the observed FTIR characteristics of the deposited film are monitored to determine the optimum post deposition heat treatment temperature.

19. A method as claimed in claim 13, wherein said deposited film forms a buffer, core
5 or cladding of an optical component.

20. A method as claimed in claim 19, wherein said optical component is a multiplexer or demultiplexer.

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